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NEW RECORDS AND A NEW SPECIES OF *CRATAEGUS* (ROSACEAE) IN TEXAS

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ABSTRACT

Study of *Crataegus* during the last 4 years has revealed a number of interesting records. *Crataegus stevensiana* Sarg., previously known only from Oklahoma and Kansas, is reported from north and central Texas, and is added to the Texas flora. *Crataegus dallasiana* Sarg., a Texas endemic previously known only from historic collections from Dallas County, is newly reported from Ellis County. **Crataegus turnerorum** Enquist, *sp. nov.*, is described and reported from 7 counties in central and west Texas.

KEY WORDS: Floristics, taxonomy, Texas, *Crataegus*, Rosaceae.

INTRODUCTION

Crataegus is deservedly known as a difficult and problematic genus. The difficulty is compounded by the many collections which omit such important data as the color of the predehiscent anthers. In addition, hybrids and unusual forms tend to be over represented in collections, causing a distortion in the perception of their quantitative distribution.

Careful collecting, as suggested by Kruschke (1955), with repeated visits to numbered trees in order to collect both flowering and fruiting specimens from the same tree, is the desired approach. Probable hybrids and unusual forms are still found, but their frequency and significance is much reduced.

Referring to those characters he found most useful in defining species of *Crataegus*, Palmer (1925) stated, "In these tables the color of the anthers, number of stamens, glabrous or pubescent character of corymbs at flowering time and general shape of the leaves were adopted for most of the groups, in the order named." The color of the predehiscent anthers is probably the most important character used in making species (or varietal) determinations, but such data is usually missing from specimen labels. Even when the color is noted, caution is necessary. Dehiscent anthers all appear yellow due to the pollen within.

This writer agrees with the order of importance assigned to those characters listed by Palmer in 1925, with the reservation, of course, that anther color alone is an insufficient distinction for the description of a new species. Those collections of flowering material made by the author and cited in this paper all note the color of the unopened anther.

CRATAEGUS STEVENSIANA, NEW TO TEXAS

Crataegus stevensiana Sargent, J. Arnold Arb., 4:99. 1923. TYPE: U.S.A. Kansas: Wilson Co., Neodesha, 19 Sep 1922, *E.J. Palmer 21562* (HOLOTYPE: GH!). *Crataegus reverchonii* Sargent var. *stevensiana* (Sarg.) Palmer, Brittonia 5:482. 1946.

Specimens examined: U.S.A. Kansas: Wilson Co.: Neodesha, 5 May 1922, *E.J. Palmer 21158* (GH); 22 May 1922, *E.J. Palmer 21374* (GH); Neodesha, thickets, rocky hills, 19 Sep 1922, *E.J. Palmer 22042* (GH); Neodesha, thickets, limestone hills, 6 Nov 1924, *E.J. Palmer 26825* (GH).

Oklahoma: Greer Co.: granite, occasional along creek in mountains, 7 Oct 1913, *G.W. Stevens 2891* (GH). Kiowa Co.: Snyder, slopes of granite hills, 18 Jul 1917, *E.J. Palmer 12586* (GH); Snyder, slopes of granite hills, 26 Oct 1917, *E.J. Palmer 13075* (GH). Logan Co.: Orlando, along small stream, 25 Jul 1940, *B.F. Kiltz K-623* (GH). Seminole Co.: Asher, dry hills, 10 Apr 1936, *Delzie Demaree 11974* (GH).

Texas: Comanche Co.: Sweetwater Creek north of Sidney, tree # 424, 3 Aug 1989, *Enquist 1470* (GH,MO,SMU,TAES,TEX,US). Dallas Co.: Dallas, common on prairie, 27 Apr 1900, *J. Reverchon 454* (GH). Gillespie Co.: East side of Hwy. 87, 8.5 miles south of intersection with Hwy. 290 in Fredricksburg, tree # 362, 26 Apr 1989, *Enquist 953* (GH,MO,SMU,TAES,TEX,US); East side of Hwy. 87, 8.5 miles south of intersection with Hwy. 290 in Fredricksburg, tree # 362, 22 Jun 1989, *Enquist 1430* (GH,MO,SMU,TAES,TEX,US); West side of Hwy. 87, 8.7 miles south of intersection with Hwy. 290 in Fredricksburg, tree # 361, 22 Jun 1989, *Enquist 1439* (GH,MO,SMU,TAES,TEX,US); 0.5 mi east of South Grape Creek on Hwy. 290, south side, in Post Oak woods, tree # 410, 22 Jun 1989, *Enquist 1425* (GH,MO,SMU,TAES,TEX,US); 0.5 mi east of South Grape Creek on Hwy. 290, south side, in Post Oak woods, tree # 410, 8 Oct 1989, *Enquist 1567* (GH,MO,SMU,TAES,TEX). Hill Co.: 2 miles north of Carl's Corner on west side of I-35, tree # 350, 22 Apr 1989, *Enquist 819* (GH,MO,SMU,TAES,TEX,US); 2 miles north of Carl's Corner on west side of I-35, tree # 350, 18 Jun 1989, *Enquist 1398* (GH,MO,SMU,TAES,TEX,US); 2 miles north of Carl's Corner on west side of I-35, tree # 350, 15 Oct 1989, *Enquist 1587* (GH,SMU,TAES,TEX). Jack Co.: No locality data, 12 Jun 1924, *B.C. Tharp 3029* (GH). Mason Co.: 1.6 miles south of intersection of 1851 and 1222, west side, along Sandy Creek, Edmiston property, tree # 372, 27 Apr 1989, *Enquist 1068* (GH,MO,SMU,TAES,TEX,US);

Spy Rock, along intermittent creek, tree # 371, 27 Apr 1989, *Enquist 1058* (GH,MO,SMU,TAES,TEX,US). McCulloch Co.: West side of Hwy. 71 at roadside park south of San Saba River, tree # 370, 27 Apr 1989, *Enquist 1047* (GH,MO,SMU,TAES,TEX,US); West side of Hwy. 71 at roadside park south of San Saba River, tree # 370, 23 Sep 1989, *Enquist 1552* (GH,MO,SMU,TAES, TEX,US); East side of Hwy. 71 at roadside park south of the San Saba River, tree # 473, 8 Aug 1989, *Enquist 1578* (GH,MO,SMU,TAES,TEX,US). Mills Co.: On 2005, north of Merrell Creek crossing, in Shin Oak thicket at edge of valley, west side of road, tree # 382, 2 May 1989, *Enquist 1108* (GH,MO,SMU,TAES,TEX,US).

DISCUSSION

In the course of observing *Crataegus* in the field, a particular morphological type was seen to appear in several widely separated localities. It was realized that this was a species that was not listed as a member of the Texas flora, and indeed, was no longer listed anywhere as a species.

Originally described and given species status by Sargent (1923), *Crataegus stevensiana* was relegated to varietal rank by Palmer (1946). As previously noted, Palmer listed, in 1925, those characters he found most useful in defining species of *Crataegus*. However, by 1946 Palmer had undergone a change in opinion, as evidenced by his placing in synonymy or combining several species with different stamen number and anther color. As a result of his reclassification, *C. reverchonii* Sarg. (1903), came to include three varieties, the typical variety with 10-15 reddish purple anthers, var. *stevensiana* (Sarg.) Palmer (with 10 yellow anthers), and var. *discolor* (Sarg.) Palmer (with 20 white anthers). These combinations correctly indicate a genetic interrelationship that can be seen in a few characteristics of some leaves. However, in this writer's opinion, each entity is sufficiently distinct in other characters (including stamen number and anther color) to justify species status.

Herbarium material from GH indicates some confusion existed as to the boundaries of *Crataegus reverchonii*. One sheet (Texas: Dallas Co: Dallas, common on prairie, 27 Apr 1900, *J. Reverchon 454*), labeled *C. reverchonii* but almost certainly *C. stevensiana*, bears a note stating "This is the round-leaved hawthorn of the Dallas area." Perhaps as a result, another sheet (Texas: Jack Co., *Tharp 3029*) correctly identified as *C. stevensiana* originally, was relabeled *C. reverchonii* by Palmer.

The confusion has remained to this day. In Correll & Johnston (1970), *Crataegus reverchonii* is described as having "stamens 10-15; anthers [?] pinkish-red" (brackets and question mark in the original). Vines (1960), treated the taxon as *C. reverchonii* var. *stevensiana* but he gave it a separate description and somewhat coequal status with *C. reverchonii*. In *Flora of the Great Plains* (1986), it is listed simply as a synonym of *C. crus-galli* L.

The confusion results from trying to fit two distinct species into one species description. Misidentifications have ignored significant differences in both stamen and leaf morphology. *Crataegus reverchonii* is distinguished by its stamen number (10-15) and anther color (purple). Its leaves, both on first year shoots and fruiting stems, are orbicular to broadly obovate, with roughly 50-90 per cent of the leaves orbicular. The calyx tube and pedicels are sparsely pubescent. *Crataegus stevensiana* is distinguished by its stamen number (10) and anther color (yellow). The vast majority of its leaves are obovate to narrowly obovate, with only a few orbicular leaves at the tip of first year growth. The calyx tube and pedicels are completely glabrous. In addition, the thorns are often malformed, with a characteristic crook in the last 1-3 centimeters of the tip.

Since their ranges coincide, and given the ability of hawthorns to hybridize, it would not be surprising to find forms intermediate between the two species. Such plants, however, have not been seen thus far. This writer believes that Sargent's original descriptions were substantially correct and that *Crataegus reverchonii* Sarg. and *C. stevensiana* Sarg. are best considered closely related but separate species.

CRATAEGUS DALLASIANA, REDISCOVERED

Crataegus dallasiana Sargent, *Trees and Shrubs* 1:59, pl. 30. 1903. Probable syntype (*fide* D. Boufford): U.S.A. Texas: Dallas County, Dallas, April & July 1900 (?), *J. Reverchon 279* (GH photocopy!).

Additional specimens examined: U.S.A. Texas: Dallas Co.: Dallas, Luck's (?) Mill, 3 Apr 1901, *J. Reverchon 2633* (GH,MO); Dallas, Luck's (?) Mill, 6 Aug 1901, *J. Reverchon 2662* (GH); Eagle Ford, 3 Apr 1902, *J. Reverchon 2633* (MO). Ellis Co.: Waxahachie, I-35 at South Prong Creek crossing, 200 yards north of bridge, east side, on fence in R.O.W., tree # 300, 3 Apr 1988, *Enquist 385* (TEX); Waxahachie, I-35 at South Prong Creek crossing, 200 yards north of bridge, east side, on fence in R.O.W., tree # 300, 23 Mar 1989, *Enquist 502* (GH,SMU,TEX); Waxahachie, I-35 at South Prong Creek crossing, 200 yards north of bridge, east side, on fence in R.O.W., tree # 300, 29 Mar 1989, *Enquist 594* (GH,SMU,TAES,TEX); Waxahachie, I-35 at South Prong Creek crossing, 200 yards north of bridge, east side, on fence in R.O.W., tree # 300, 6 Apr 1989, *Enquist 661* (GH,SMU,TEX); Waxahachie, I-35 at South Prong Creek crossing, 200 yards north of bridge, east side, on fence in R.O.W., tree # 300, 18 Jun 1988, *Enquist 1377* (GH,MO,SMU,TAES,TEX,US); Waxahachie, I-35 at South Prong Creek crossing, 100 yards south of bridge, about 200 yards west of Hwy., tree # 321, 29 Mar 1989, *Enquist 600* (TEX); Waxahachie, I-35 at South Prong Creek crossing, 100 yards south of bridge, about 200 yards west of Hwy., tree # 321, 6 Apr 1989, *Enquist 662* (GH,SMU,TAES,TEX); Waxahachie, I-35 at South Prong Creek crossing, 100 yards south of bridge, about

200 yards west of Hwy., tree # 321, 18 Jun 1989, *Enquist 1373* (GH,MO,SMU, TAES,TEX,US); Milford, I-35 at Richland Creek, south of bridge, 70 yards west of Hwy., between Coastal Bermuda field and old borrow pit, tree # 322, 29 Mar 1989, *Enquist 601* (TEX); Milford, I-35 at Richland Creek, south of bridge, 70 yards west of Hwy., between Coastal Bermuda field and old borrow pit, tree # 322, 6 Apr 1989, *Enquist 655* (SMU,TAES,TEX); Milford, I-35 at Richland Creek, south of bridge, 70 yards west of Hwy., between Coastal Bermuda field and old borrow pit, tree # 322, 22 Apr 1989, *Enquist 802* (GH,MO,SMU,TAES,TEX,US); Milford, I-35 at Richland Creek, south of bridge, 70 yards west of Hwy., between Coastal Bermuda field and old borrow pit, tree # 322, 18 Jun 1989, *Enquist 1387* (GH,MO,SMU,TAES,TEX,US); Milford, I-35 at Richland Creek, south side of creek, west of Hwy. about 200 yards, just west of old low water crossing, tree # 431, 5 Aug 1989, *Enquist 1480* (GH,MO,SMU,TAES,TEX,US).

DISCUSSION

Crataegus dallasiana Sarg. has been known only from Dallas County, Texas, from historic collections by Reverchon. On April 3, 1988, this species was rediscovered along a creek near Waxahachie, Texas.

The taxonomic status of *Crataegus dallasiana* has been in question. In Correll & Johnston (1970), it is listed as a synonym under *C. brazoria* Sarg. (1901). In Vines (1960), the two taxa were listed separately, each being accorded species status. Sargent felt they were distinct, and in the type description of the species provided the following comment regarding *C. dallasiana* -"Closely related to *C. brazoria* Sarg., of the Collina group, and a native of the lower Brazos River, Texas. *Crataegus dallasiana* differs from that species in the form and texture of the leaves, and in the dull red not canary-yellow early-ripening fruit, and in the color of the bark."

Visits to the area of *Crataegus brazoria*'s type locality, in Brazoria County on the Texas Gulf coast, have not yet produced an indisputably authentic specimen of that taxon. *Crataegus brazoria* may be either a distinct relict species or a product of hybridization. Specimens found in this area are attributable to *C. mollis* Scheele, *C. texana* Buckley and *C. viburnifolia* Sarg. As described, *C. brazoria* has 20 stamens, dark red (purple) anthers, and large yellow fruit. *Crataegus viburnifolia* has 20 stamens, white anthers, and large yellow fruit. *Crataegus texana* has 20 stamens, dark red (purple) anthers, and large red fruit. Obviously, a theoretical *viburnifolia-texana* hybrid would be similar to *C. brazoria*. Since *C. brazoria* was described from a single tree, the possibility must be recognized that it is simply one hybrid member of a *mollis-texana-viburnifolia* complex. Further collecting in the area of the type locality of *C. brazoria* will be necessary.

In view of this, and considering the clear identity of *Crataegus dallasiana*

and its relatively well defined distribution in north Texas, treatment of the latter as a distinct species is justified.

Sargent's type description of *Crataegus dallasiana* is incorrect in its assertion that the fruit ripen in midsummer. The first tree found flowered profusely, but a visit in early August, 1988, revealed no fruit. This was an indication of extremely poor fruit-set, not early ripening. The same tree successfully produced ripe, dull-red fruit in late October and early November of 1989. The fruit were 8-10 mm in diameter and matched the type description in all characters.

CRATAEGUS TURNERORUM, SP. NOV.

Crataegus turnerorum Enquist, *sp. nov.*, Figure 1. TYPE: UNITED STATES. Texas: Menard Co., 23 Sep 1989, *Enquist 1555* (HOLOTYPE: TEX; Isotypes: GH,MO,SMU,TAES,US).

> Frutices vel arbores parvae 1.5-4.5 m altae. Folia ovata vel elliptica 2.5-5.5(-8.0) cm longa 1.5-4.0(-5.5) cm lata, marginibus 2-serratis lobis 2-4 binatis. Flores 1.5-2.0 cm diametro; sepala 3-4 mm longa acuminata; stamina 10-15 antheris purpureis; styli 3(-4). Fructus 1.0-1.4 cm lati, depressi-sphaerici.

Shrub to small tree, 1.5-4.5 m high. Stems straight to slightly zigzag, glabrous and lustrous, bearing a few scattered pale lenticels; light brown tinged with green in first and second years, becoming light ash gray; thorns slender (to stout), straight to slightly curved, black, 2-5.5 cm long. Leaves ovate to elliptic, glabrous, acute, basally cuneate to broadly cuneate, 2.5-5.5(-8) cm long, 1.5-4(-5.5) cm wide, with 2-4 pairs of short lobes, margin doubly serrate, petioles 0.3-1 cm long, stipules linear and bearing stalked glands, stipules on first year growth often lunate. On unfolding, leaves slightly pubescent, mainly along base of midrib and base of primary veins. Flowers opening in mid April, 1.5-2 cm in diameter, in a 3-12 flowered corymbose panicle with glabrous pedicels. Sepals 3-4 mm long, abruptly narrowed, entire to sparsely serrate, often with stalked glands, adaxially pubescent. Petals orbicular to elliptic, 0.5-1 cm long. Stamens 10-15. anthers deep purple. Styles 3(-4), with ring of tomentum at base. Fruit slightly flattened, 1-1.4 cm wide, 0.8-1.3 cm deep, nutlets potentially 5, usually maturing 3(-4), 5-7 mm long, dorsally ribbed.

Additional specimens examined: U.S.A. Texas: Crockett Co.: Ozona, Apr 1924, *Cory s.n.* (TAES). Jeff Davis Co.: Musquiz Canyon, tree # 390, 6 May 1989, *Enquist 1144* (GH,MO,SMU,TAES,TEX). Mason Co.: 1.6 miles south of intersection of highways 1851 and 1222, west side, along Sandy Creek, Edmiston property, tree # 373, 27 Apr 1989, *Enquist 1076* (GH,MO,SMU,TAES, TEX). Menard Co.: Menard, Rocky bluffs, 10 May 1917, *E.J. Palmer 11853* (GH); Menard, Rocky river banks, 10 May 1917, *E.J. Palmer 11862* (GH);

Ft McKavett, low water crossing of San Saba River, tree # 375, 2 Nov 1986, *Enquist 233* (TEX,SMU); Ft. McKavett, low water crossing of San Saba River, tree # 375, 18 Apr 1989, *Enquist 740* (GH,SMU,TAES,TEX); Ft. McKavett, low water crossing of San Saba River, tree # 375, 27 Apr 1989, *Enquist 1005* (GH,MO,SMU,TAES,TEX,US); Ft. McKavett, low water crossing of San Saba River, tree # 375, 23 Sep 1989, *Enquist 1549* (GH,MO,SMU,TAES,TEX,US); Menard, 4 miles south on Hwy. 83, east side of road, tree # 345, 18 Apr 1989, *Enquist 771* (GH,SMU,TAES,TEX); Menard, 4 miles south on Hwy. 83, east side of road, tree # 345, 23 Sep 1989, *Enquist 1554* (GH,MO,SMU,TAES,TEX, US); Menard, crossing of 190 and Scalp Creek, tree # 343, 20 Apr 1986, *Enquist 202* (GH,TAES,TEX); Menard, crossing of 190 and Scalp Creek, tree # 343, 1 Jul 1986, *Enquist 216* (TEX); Menard, crossing of 190 and Scalp Creek, tree # 343, 12 Apr 1989, *Enquist 709* (TEX); Menard, crossing of 190 and Scalp Creek, tree # 343, 18 Apr 1989, *Enquist 757* (GH,MO,SMU,TAES,TEX,US); Menard, crossing of 190 and Scalp Creek, tree # 343, 23 Sep 1989, *Enquist 1555* (GH,MO,SMU,TAES,TEX,US); Menard, Chapman draw, tree #344, 10 Apr 1986, *Enquist 201* (TEX); Menard, Chapman draw, tree #344, 18 Apr 1989, *Enquist 762* (GH,MO,SMU,TAES,TEX,US); Menard, Chapman draw, tree #344, 23 Sep 1989, *Enquist 1551* (GH,MO,SMU,TAES,TEX); Menard, shin oak thickets on hillside 0.5 miles west of Scalp Creek on Hwy. 190, tree # 340, 18 Apr 1989, *Enquist 748* (GH,MO,SMU,TAES,TEX); 1.8 miles east of entrance to Clark Ranch, tree # 368, 10 Apr 1986, *Enquist 200* (TAES,TEX); 1.8 miles east of entrance to Clark Ranch, tree # 368, 27 Apr 1989, *Enquist 1023* (GH,MO,SMU,TAES,TEX,US). Schleicher Co.: County road crossing of Middle Prong of the San Saba River, 3.2 miles west of intersection with Hwy. 864, tree # 367, 27 Apr 1989, *Enquist 996* (GH,MO,SMU,TAES,TEX); County road crossing of the Middle Prong of the San Saba River, 3.2 miles west of intersection with Hwy. 864, tree # 339, 23 Sep 1989, *Enquist 1548* (GH,MO,SMU,TAES,TEX,US). Sutton Co.: 30 miles SW of Sonora, 4 Apr 1933, *Cory 5505* (TAES); Crossing of Granger Draw Road and Dry Devil's River, tree # 338, 19 Apr 1989 *Enquist 728* (SMU,TAES,TEX); Crossing of Granger Draw Road and Dry Devil's River, tree # 338, 23 Sep 1989, *Enquist 1556* (GH,MO,SMU,TAES,TEX,US); Old Aldwell Ranch, along Dry Devil's River, tree # 336, 19 Apr 1989, *Enquist 717* (GH,MO,SMU,TAES,TEX); Old Aldwell Ranch, along Dry Devil's River, tree # 336, 23 Sep 1989, *Enquist 1547* (GH,MO,SMU,TAES,TEX,US). Val Verde Co.: Taylor Crossing on Devil's River, tree # 335, 19 Apr 1989, *Enquist 710* (GH,MO,SMU,TAES,TEX); Taylor Crossing on Devil's River, tree # 335, 23 Sep 1989, *Enquist 1546* (GH,MO,SMU,TAES,TEX,US).

In the course of field studies, this writer came across a hawthorn that could not be identified. At that time it was apparent that it was either a new record for Texas or a new species. Additional study since then has convinced me it is a new species.

Figure 1. Type specimen of *Crataegus turnerorum* Enquist.

The earliest collections of this taxon known to me were made by Palmer in 1917. One sheet was mistakenly attributed by Sargent to *Crataegus uvaldensis* Sarg. (1922) in his type description of that species– "Menard County, low woods on the San Saba River, Menard, *E.J. Palmer, no. 11889* (sterile branches only), May 12, 1917." Two other sheets (10 May 1917, *E.J. Palmer 11853* and *11862*) are simply labeled *Crataegus* with the words "*crus-galli*" written to one side in parentheses. They also bear the penciled notation "*C. glabriuscula*" and, until now, were included in those folders. Both sheets hold branches that are in excellent fruit and are without doubt *C. turnerorum.* The Tracy Herbarium (TAES) has two collections of *C. turnerorum* made by Cory in 1924 and 1933 but labeled *C. crus-galli* L. and *C. tracyi* Ashe respectively.

The closest relatives of *Crataegus turnerorum* are found in New Mexico. A comparison of the type description of *C. turnerorum* with the type description of *C. wootoniana* Eggles. (1907) reveals that a number of their characters are similar (leaf shape and size, lobing, serration, lack of pubescence; stipule shape; sepal shape, serration and pubescence) and seemingly differ only in degree. However, study of the type of *C. wootoniana* (U.S.A. New Mexico: Socorro Co. 23 Aug 1903, *O.B. Metcalfe 584* [Isotype: NMC!]) demonstrates that the two species are distinguished by numerous small differences. *Crataegus wootoniana* has a more truncate leaf blade that is often as wide as it is long, and long petioles which are not winged. It also has 5-10(8) purple or light purple anthers and fruit that is longer than wide. *Crataegus turnerorum* has a more cuneate leaf blade that is significantly longer than wide and short petioles that are slightly winged. It has 10-15(13-15) purple anthers and fruit that is wider than long. *Crataegus erythropoda* Ashe is another possible relative of *C. turnerorum.*

Crataegus turnerorum can be found growing along a few streams and streambeds of the Edwards Plateau and Llano Uplift, usually in the shade of *Quercus fusiformis* Small. It is also found on dry hillsides among thickets of *Quercus sinuata* Walt. var. *breviloba* (Torr.) C.H. Mull. One collection is from Musquiz Creek, in Musquiz Canyon of the Davis Mountains, where it is found associated with *Crataegus tracyi* Ashe.

Crataegus turnerorum Enquist is named for Dr. Billie Turner and his wife Gayle. Dr. Turner has extended every possible assistance to this writer in his study of *Crataegus.* For this, I am deeply grateful.

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